



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 228.4-2019

**Metallic materials -- Tensile testing -- Part 4: Method of test in
liquid helium**

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Foreword

GB/T 228 "Metallic materials - Tensile testing" is divided into the following 4 parts:

- Part 1: Method of test at room temperature;
- Part 2: Method of test at elevated temperature;
- Part 3: Method of test at low temperature;
- Part 4: Method of test in liquid helium.

This Part is Part 4 of GB/T 228.

This Part is drafted in accordance with the rules given in GB/T 1.1-2009.

This Part replaces GB/T 24584-2009 "Metallic materials - Tensile testing - Method of test in liquid helium". Compared with GB/T 24584-2009, the main technical changes of this Part are as follows:

- ADD a control method for strain rate (see the Introduction);
- ADD a note to the Scope (see Clause 1);

- Modify the designation of austenitic stainless steel to domestic designation (see Clause 6; Clause 6 of GB/T 24584-2009);
- ADD notes to the extensometer (see Clause 6);
- ADD a note to the round bar test piece (see Clause 7);
- ADD dimensional requirements for non-standard test pieces (see Clause 7);
- Modify the range of test rate (see Clause 8; Clause 8 of GB/T 24584-2009);
- ADD the uncertainty of the determination results (see Clause 11).

This Part uses the redraft law to modify and adopt ISO 6892-4:2015 "Metallic materials - Tensile testing - Part 4: Method of test in liquid helium".

The technical differences between this Part and ISO 6892-4:2015 and the reasons are as follows:

- As for the normative references, this Part has adjusted the technical differences, to adapt to the technical conditions of China. The adjustments are mainly reflected in Clause 2 "Normative references". The specific adjustments are as follows:

? Replace ISO 6892-1:2009 with GB/T 228.1-2010 which modifies and adopts the international standard (see Clause 3, 6.1.2, 7.3, and Clause 11);

? Replace ISO 6892-3 with GB/T 228.3 which modifies and adopts the international standard (see Clause 3);

? Replace ISO 7500-1 with GB/T 16825.1 identical to the international standard (see 6.1.1);

? Replace ISO 9513 with GB/T 12160 identical to the international standard (see 6.4.1);

? ADD reference to GB/T 34104 (see 6.1.5).

- Modify the type of test piece in Annex A; ADD a rod or plate test piece with a diameter or width of 3 mm (see Table A.1 and Table A.2).

This Part was proposed by China Iron and Steel Association.

This Part shall be under the jurisdiction of National Technical Committee 183 on Steel of Standardization Administration of China (SAC/TC 183).

Drafting organizations of this Part: Grinm Group Corp., Ltd., Technical Institute of Physics and Chemistry of the Chinese Academy of Sciences, China Metallurgical Information and Standardization Institute, Central Iron & Steel Research Institute, China United Test & Certification Co., Ltd., Industrial Products and Raw Materials Testing Technology Center of Shanghai Entry-Exit Inspection and Quarantine Bureau, China Metallurgical Construction Research Institute Co., Ltd.

Main drafters of this Part: Zhang Hongju, Wang Fusheng, Qu Chengbing, Dong Li, Gao Yifei, Li Pu, Huang Chuanjun, Hou Huining, Zhai Zhanjiang, Sun Zeming, Wu Yiwen, Xiao Hongmei, Xia Wen, Jin Yujia, Li Sijin, Wang Wenzhong, Xiao Cun.

The previous editions of the standard replaced by this Part were released as follows:

- GB/T 24584-2009.

Metallic materials - Tensile testing - Part 4:

Method of test in liquid helium

1 Scope

This Part of GB/T 228 specifies the principle, definitions, symbols and designations, test pieces and their dimensions measurement, apparatus, testing conditions, determination of properties, and test report for the method of tensile testing of metallic materials in liquid helium temperature (the boiling point is $-269\text{ }^{\circ}\text{C}$ or 4.2 K , designated as 4 K).

This Part applies to the determination of the tensile properties of metallic materials in liquid helium temperature. This Part may apply also to tensile testing at cryogenic temperatures (less than $-196\text{ }^{\circ}\text{C}$ or 77 K), which requires

special apparatus, smaller test pieces, and concern for serrated yielding, adiabatic heating, and strain-rate effects.

Note: The boiling point of the rare ^3He isotope is 3.2 K. Usually, the tests are performed in ^4He or a mixture of ^3He and ^4He with a high concentration of ^4He . Therefore, the temperature is, as designated before, 4 K.

2 Normative references

The following documents are indispensable for the application of this document.

For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 228.1-2010 Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2009, MOD)

GB/T 228.3 Metallic materials - Tensile testing - Part 3: Method of test at low temperature (GB/T 228.3-2019, ISO 6892-3:2015, MOD)

GB/T 12160 Calibration of extensometers used in uniaxial testing (GB/T 12160-2002, ISO 9513:1999, IDT)

GB/T 16825.1 Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system (GB/T 16825.1-2008, ISO 7500-1:2004, IDT)

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